Pool Relax

Instruction Manual

Chlorine
Bromine
Oxygen

GB

BAYROL

Contents

DANGER WARNINGS

Note: The dosing fluids used are corrosive and / or inflammable. Never allow the two ends of the pressure hoses on vacuum pumps to hang loose, as this will permit the corrosive and inflammable fluids to escape. During installation and operation, always observe the relevant health and safety regulations when installing and using the device. The system should only be installed and put into operation by qualified expert personnel.

WARNING

Changing the system settings (default values) can be dangerous under certain circumstances. Therefore, changes must only be made by trained technicians. The operator assumes liability if the equipment is used improperly or the settings are modified incorrectly.

The system must be switched off immediately and protected against being switched on again if it probable that the system cannot be operated safely and without danger.

This is the case, for example, if

- the system is visibly damaged,
- the system no longer appears to be functional for whatever reason,
- the system was stored for lengthy periods under unfavourable conditions (e.g. improper winter storage)

List of Abbreviations

pH	pH value [pH], also abbreviation for pH control
mV	Redox potential [mV], also abbreviation for redox control or measurement
T	Temperature [°C/°F], also abbreviation of temperature measurement
D+	Dosage to raise pH / mV measurement
D-	Dosage to lower pH / mV measurement
A/D converter	Analogue/digital converter
LCD	Liquid crystal display
LED	Light emitting diode
	Warning for preventing potential problems.

1 Introduction

Congratulations on the purchase of your Pool Relax measuring, controlling and dosing system. You have decided for a device that greatly simplifies the care of your swimming pool with its high quality design and operating reliability.
Regardless of which treatment method you have decided to use, your new Pool Relax will manage the water quality in your pool.

Pool Relax is available as

Pool Relax Chlorine
For measuring and controlling pH and redox values, dosing of pH-Minus or pH-Plus (adjustable) and ChloriLiquid.

Pool Relax Bromine
For measuring and controlling pH and redox values, dosing of pH-Minus or pH-Plus (adjustable). Bromine, a water disinfection agent, is dissolved in a feeder and added as needed via a dosing valve.

Pool Relax Oxygen
For measuring and controlling pH and redox values, dosing of pH-Minus or pH-Plus (adjustable), and time-controlled and temperature-compensated dosing of BayroSoft.

To obtain crystal clear water, **Flockmatic** can be used as an option with all three treatment variants. By continuously adding the flocculant, the system even removes particles from the swimming pool water that would otherwise simply pass through the sand filter of your system.

If you would like to have access to your Pool Relax system from anywhere, we recommend the use of PoolConnect. With this GSM module, you can communicate with your system via SMS at any time. For example, you can call up the water values or have the system send any alarms to your mobile phone.

Please read these instructions carefully to familiarize yourself with the system and how to operate it. If you have any questions, please contact your dealer or the BAYROL Service Centre.

2 Installation of Pool Relax

2.1 General Information

Perform all installation work carefully and comply with the applicable safety regulations. During installation, disconnect the measurement, control and dosing device and all other electrical loads such as the electrical heating or the circulating pump from the mains.

In addition, comply with the applicable regulations regarding the installation of electrical devices.

General notes on installation:

- Ensure that the hoses are laid without kinking and that chafing cannot occur.
- Avoid laying the hoses over sharp edges.
- Carefully connect all hoses and check that the connections are firmly attached.
- Avoid unnecessarily long hose lengths.
- Do not guide the hoses directly over warm pipes or systems.
- Check that the float in the measurement chamber can float freely.
- Adjust the water flow through the cell so that the float just barely lies against the upper end in its guide bore.
- If you are using a Flockmatic pump for dosing Quickflock Automatic+, please connect it to a connection controlled by the circulating pump (circulation OFF – flocculation OFF; circulation ON – flocculation ON)

2.2 Selecting the Installation Location

To mount Pool Relax, select a dry, frost-protected, sheltered and level location on a vertical wall. Ensure that the area is readily accessible and well-ventilated. There should be no energized electrical cables, contactors, electric motors, etc. in its vicinity. The installation location should be as close as possible to where the measuring water is extracted and returned.

The supply voltage for the controller and the vacuum pumps should not exceed 240V/50Hz. The allowable operating temperature range is from 0 to 50 ^{O}C, and the allowable humidity level equals 0-90 %.

If you are using a PoolConnect system, the installation location selected should have a good network connection. If this is not possible, the antenna can be replaced by a more sensitive antenna or connected to Pool Relax using a high quality extension cable (both of which are commercially available).

2.3 Mounting Pool Relax on the Wall

- The base plate with the mounted measurement cell can be used as a template by holding it up against the mounting location and marking the drill holes on the wall.
- After the base plate is securely mounted on the wall, the controller housing is attached to the tongue and groove joint provided for this purpose.
- The housing is attached using a slotted screw that can be accessed through an opening in the pump hood holder.

- Connect the supplied pH pressure line on one side with the pressure side (right connector) of the left-hand vacuum pump. Connect the other side with the upper injection piece of the measurement cell. Ensure that the connection is tight and securely fastened.
- Connect the supplied pressure line for ChloriLiquid or BayroSoft on one side with the pressure side of the right-hand vacuum pump. Connect the other side with the upper injection piece of the measurement cell. Ensure that the connection is tight and securely fastened.
- Connect the flow switch and the temperature sensor (Pool Relax Oxygen only). Ensure that the connectors are inserted in the sockets provided for this purpose (see the "Stickers on Controller Housing" and "Connections on Controller Housing" chapters).

2.4 Electrical Connection

The system has been designed and constructed according to the applicable regulations. It was carefully inspected before leaving the factory and left the factory in a perfectly safe condition.

The equipment can only be operated safely if all of the instructions contained in this manual are followed. The equipment should be installed by a licensed electrician.

The supply voltage for the device may not exceed 240 V / 50 Hz. The allowable operating temperature range is from 0 to 50^{O}C, and the allowable humidity level equals 0-90 %.

Ensure that all plug-in connections are protected against water, as is standard practice for electrical connections.

2.4.1 Double Dosing Pump Lock

Pool Relax is equipped with a double pump lock that offers a very high level of safety.

The flow switch in the measurement cell ensures that the dosing pumps can only be switched on if a sufficient amount of water is flowing through the measurement cell.

In addition, the dosing pumps are supplied with the line voltage through a separate power supply. The power supply must be switched in such a manner that the dosing pumps are only supplied with current when the circulating pump is running.

In this way, dangerous dosing is prevented even in situations in which there is no flow, i.e. the system is doubly safeguarded.

For connections, please see the "Connections on Controller Housing" chapter.

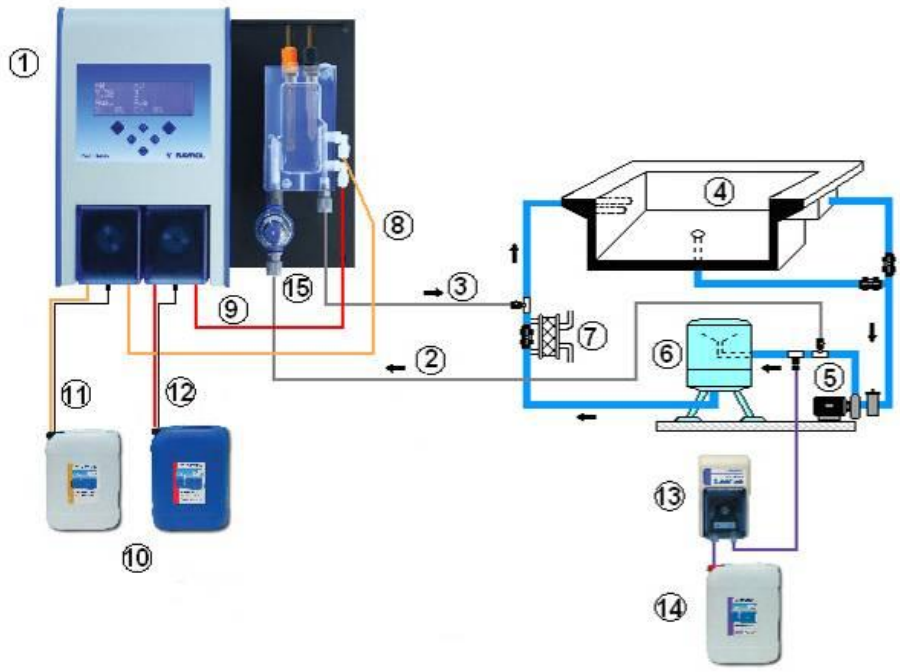
2.4.2 Earthing the Measurement Cell

The Pool Relax measurement cell is equipped with an earth screw that is used for diverting any potentials on the pool water.

	**Note:** The earthing provided for the plexiglass measurement chamber MUST be installed. This earthing SHOULD NOT be laid into Pool Relax (earthing via the Pool Relax power cable) but MUST be connected to a separate, secure earth. Make sure that the earthing is functioning properly. Always ensure that fault current is not flowing into the water of the swimming pool. Professional measurement is recommended.

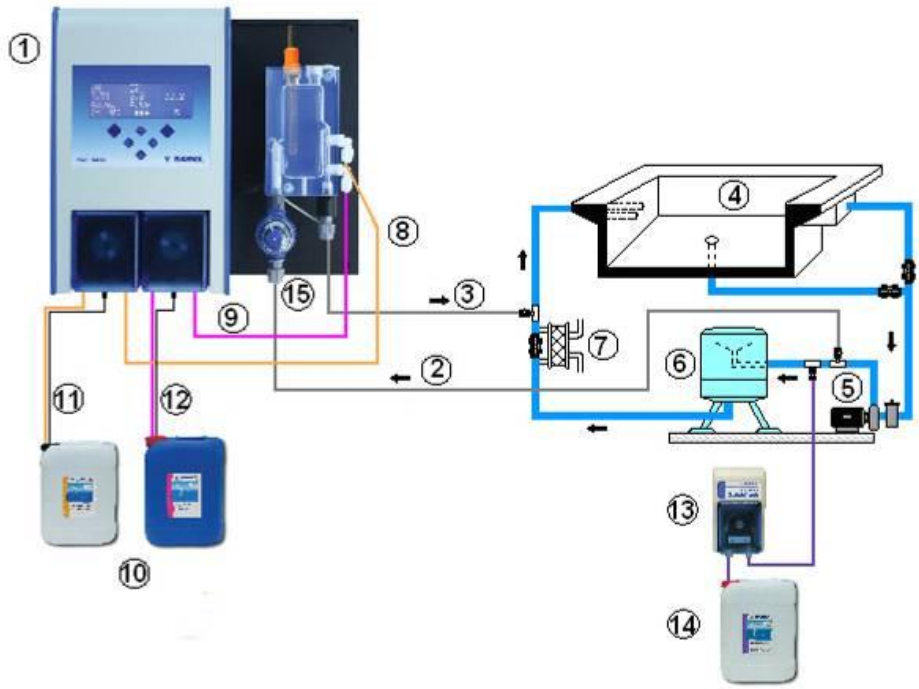
2.5 Installation Plans

2.5.1 Pool Relax Chlorine Connection



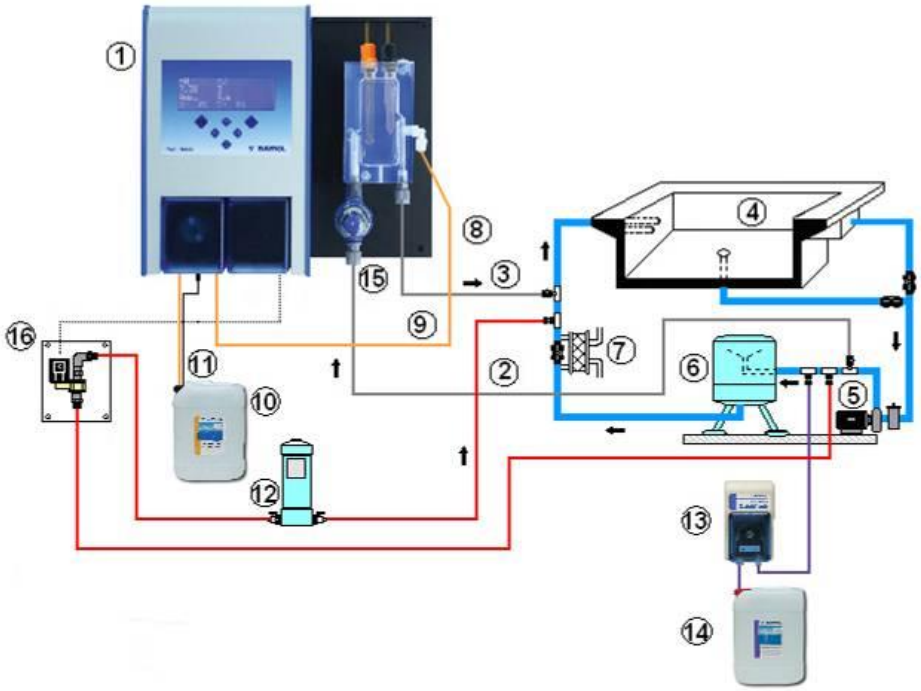
1 Pool Relax Chlorine
2 Measurement water intake
3 Measurement water return
4 Swimming pool
5 Circulating pump
6 Sand filter
7 Heat exchanger
8 pH pressure line
9 ChloriLiquid pressure line
10 Containers for pH-Minus and ChloriLiquid
11 pH-Minus suction line
12 ChloriLiquid suction line
13 Flockmatic (optional)
14 Quickflock Automatic+ canister (optional)
15 Prefilter

2.5.2 Pool Relax Oxygen connection



1 Pool Relax Oxygen
2 Measurement water intake
3 Measurement water return
4 Swimming pool
5 Circulating pump
6 Sand filter
7 Heat exchanger
8 pH pressure line
9 BayroSoft pressure line
10 pH-Minus and BayroSoft containers
11 pH-Minus suction line
12 BayroSoft suction line
13 Flockmatic (optional)
14 Quickflock Automatic+ canister (optional)
15 Prefilter

2.5.3 Pool Relax Bromine connection



1 Pool Relax Bromine
2 Measurement water intake
3 Measurement water return
4 Swimming pool
5 Circulating pump
6 Sand filter
7 Heat exchanger
8 pH pressure line
9 pH pressure line
10 pH-Minus container
11 pH-Minus suction line
12 Bromine feeder
13 Flockmatic (optional)
14 Quickflock Automatic+ canister (optional)
15 Prefilter
16 Bromine magnetic valve

2.6 Putting into Operation

Before putting the system into operation, all previously described steps must be performed and the conditions specified there must be met!

In addition, the containers with the water care agents must be connected to the system.

- To do so, connect the hose of the dosing lances with the suction side (left connector) of the respective dosing pump. Ensure that the hose lengths are short and that the screw connections on the pump and suction lance are firmly attached.
- Connect the BNC connectors of the suction lances with the respective socket on the controller (see also the "Connection on Controller Housing" chapter).

	ATTENTION: Use BAYROL water care products only!

2.6.1 Pool Relax Chlorine

- Bring the pH value of the pool water to 7.2. You can manually dose the pH to do so (see "pH Measuring and Control Module"). If the pH value differs widely from 7.2, you can use pH-Minus/pH-Plus in a granular form (it is important that you follow the dosing instructions on the product package). It is important that you check the pH value with the supplied pool tester.
- After adjusting the pH value, bring the chlorine value of the swimming pool water to the desired level of free chlorine (recommendation: 0.6 mg/l). You can manually dose the Cl to do so (see "Redox Measuring and Control Module"). In large pools, you can also use Chlorifix (follow the dosing instructions on the product packaging). It is important that you check the chlorine value with the supplied pool tester.
- When you adjust the pH and chlorine value of the pool water, you can simultaneously calibrate the pH and redox electrodes with the buffer solution provided. Apply the 1-point calibration method for both electrodes.
- The redox value that results when the chlorine value of the pool water is adjusted (recommendation: 0.6 mg/l) can be used as the redox setpoint. A precondition is that the pH value must already be close to the setpoint (+/- 0.1) and the redox electrode must be calibrated with the redox buffer.

- As soon as the pH and redox values in the pool water are close to the setpoints, you can set the control of the two control modules to Auto.
- We recommend that you monitor the control behaviour over a period of time and adjust it to the conditions prevailing in the pool, if necessary. In particular, this applies when the current values in the pool still vary widely from the setpoints.
  A PoolConnect module can be used for this purpose, which enables access to Pool Relax via a mobile phone.

2.6.2 Pool Relax Oxygen

To ensure good water quality when treating water with BayroSoft, carefully adhere to the following requirements.

A) Technical requirements

- Correct installation and operation of the pool's hydraulic equipment, water supply (including overflow tank) and filtering system
- The filter must operate for at least 10 hours/day
- Backwash at least once a week
- Sufficiently high backwash speed of 60 m/h and backwash time of at least 3 minutes
- Walls and floor of the pool must be cleaned regularly using a suction device – pool vacuum cleaner
- Filter sand must be checked regularly and replaced as necessary

B) Measures required in addition to dosing with BayroSoft

- Before putting the system into operation, administer a shock chlorination using 25 g of Chlorifix per cubic metre of water. The chlorine should act for at least 3 days.
- A lined swimming pool with a new liner must be treated with chlorine for at least 14 days during which the chlorine level must be kept constant at over 3 mg/l.
- After this period, start the BayroSoft treatment immediately and do not wait for the chlorine level to break down.
- Regular flocculation with Superflock or the Flockmatic dosing device (Quickflock Automatic+) is highly recommended.
- Occasionally check that BayroSoft is present in the water. If possible, do this on the day **preceding** the next dosing (there should still be at least 10 mg/l of BayroSoft in the pool).
  To check this, simply dip a BayroSoft QuickTest test strip into the water. A blue discolouration indicates that BayroSoft is present.

C) Tips and tricks regarding inadequate water quality (BayroSoft)

Generally speaking, inadequate water quality is caused by a lack of BayroSoft in the swimming pool's water over a long period of time. Organic substances can build up in the water, resulting in cloudiness or causing the swimming pool walls to become slippery. When this first occurs, check to see whether there is any BayroSoft in the water. Dip a BayroSoft test strip in the water shortly before the next dosing takes place. The test strip must at least turn light blue (corresponds to approx. 10 mg/l). If no trace of BayroSoft can be detected, increase the dose amount so that BayroSoft is always present in the water.

D) How can the water quality be corrected?

- If the problem is just that the water is cloudy but the pool walls are not slippery, a double manual dosage and the addition of a Superflock flocculation cartridge will be sufficient. The water quality will be correct by the next day.
- If the water is cloudy and the pool walls are slippery, this indicates severe organic contamination and it will be necessary to administer a single shock chlorination in order to return the water to the required quality.
  Note: BayroSoft and chlorine neutralise each other, thereby rendering each other ineffective. Therefore, it must be ensured that no BayroSoft remains in the water before applying chlorine. Otherwise the chlorine will be ineffective. Use the BayroSoft test strips. An effective shock chlorination is only possible after there is no blue discolouration, indicating that there is no more BayroSoft in the water.

  Recommended dose amount for an effective chlorine shock: 1 tablet of Chloriklar per cubic metre or 25 grams of Chlorifix per cubic metre.

Important: When administering a shock chlorination, it is essential to clean the pool by mechanical means in addition. Slippery deposits form a so-called "bio-film", which is not be completely eliminated even with high concentrations of chlorine. As soon as the slippery deposit is destroyed by mechanical cleaning, the chlorine can act and fully break down the organic contaminants. Resume BayroSoft water treatment at least 24 hours but no later than 48 hours after the chlorine shock is administered. You do not need to wait for the chlorine levels to break down.

Procedure for Putting into Operation

- Bring the pH value of the pool water to 7.2. You can manually dose the pH to do so (see "pH measuring and control module"). If the pH value differs widely from 7.2, you can use pH-Minus/pH-Plus in a granular form (it is important that you follow the dosing instructions on the product package). Check the pH value with the supplied Pooltester/BayroSoft test strips.
- Perform the shock chlorination specified under B).
- Determine the basic dose according to the formula

$$\frac{\text{Pool volume [m}^3\text{]} \cdot 0.5}{10} = \text{BayroSoft basic dose [liters]}$$

  and enter this value into the device as the basic dose.
- When you adjust the pH value or perform a shock chlorination, you can simultaneously calibrate the pH electrode with the supplied buffer solution. Apply the 1-point calibration method.
- As soon as the pH value is close to the setpoints, you can set the control of the pH value and the O_2 automatic dosing system to Auto. At high water temperatures, also activate the temperature compensation (see "Configuration O_2" and "Functional Description O_2").
- We recommend that you monitor the control behaviour over a period of time and adjust it to the conditions prevailing in the pool, if necessary.
  A PoolConnect module can be used for this purpose, which enables access to Pool Relax via a mobile phone.
- In any case, it is necessary that you check the BayroSoft content in the pool water using the supplied BayroSoft test strips. Shortly **after** the main dosing, the measured value should equal 35-50 mg/l (dark blue colour) and shortly **before** the next main dosing the value should equal at least 10 mg/l (light blue colour).

2.6.3 Pool Relax Bromine

- Bring the pH value of the pool water to 7.2. You can manually dose the pH to do so (see "pH measuring and control module"). If the pH value differs widely from 7.2, you can use pH-Minus/pH-Plus in a granular form (it is important that you follow the dosing instructions on the product package). It is important that you check the pH value with the supplied pool tester.
- First bring the bromine value of the swimming pool water to the desired value. (Recommendation: 2-4 mg/l). ATTENTION: Depending on the pool size and water temperature, this bromine value may not reach its final level until after several days. To ensure a sufficient degree of water disinfection from the beginning, we recommend an initial disinfection with chlorine, e.g. with Chlorifix. It is important that you check the bromine value with the supplied pool tester.
- When you adjust the pH and bromine value of the pool water, you can simultaneously calibrate the pH and redox electrodes with the supplied buffer solution. Apply the 1-point calibration method for both electrodes.
- The redox value that results when the bromine value of the pool water is adjusted (recommendation: 2-4 mg/l) can be used as the redox setpoint. A precondition is that the pH value must already be close to the setpoint (+/- 0.1) and the redox electrode must be calibrated with the redox buffer.
- As soon as the pH and redox values in the pool water are close to the setpoints, you can set the control of the two control modules to Auto.
- We recommend that you monitor the control behaviour over a period of time and adjust it to the conditions prevailing in the pool, if necessary. In particular, this applies when the current values in the pool still vary widely from the setpoints.
  A PoolConnect module can be used for this purpose, which enables access to Pool Relax via a mobile phone.

3 Maintenance of Pool Relax

	**ATTENTION:** Disconnect all power connections before beginning maintenance work!

3.1 Maintenance Plan

Monthly maintenance:

- Visually inspect all dosing lines and hoses for leakages
- Check the filter sieve and clean it if necessary
- Check the water values with the supplied test kitand readjust the settings if necessary

Quarterly maintenance:

- Visually inspect all dosing lines and hoses for leakages
- Check the filter sieve and clean it if necessary
- Check the water values with the supplied test kitand readjust the settings if necessary
- Calibrate the pH and redox electrodes using the supplied buffer solutions

Annual maintenance:

- Visually inspect all dosing lines and hoses for leakages
- Check the filter sieve and clean it if necessary
- Check the water values with the supplied test kitand readjust the settings if necessary
- Replace and calibrate the pH and redox electrodes using the supplied buffer solutions
- Replace the hoses of the dosing pumps

3.2 Dosing Pump Hoses

The hoses of the dosing pumps must be replaced annually or earlier if worn. Use original replacement hoses only. They can be obtained from your swimming pool dealer.

The following hoses may be used:

171 219 Replacement hose set 0.9 l/h (for chlorine and pH-Plus/pH-Minus, recognizable by the white nozzles)

171 216 Replacement hose set 6.0 l/h (for BayroSoft, recognizable by the black nozzles)

Hose Replacement

To replace the hoses, proceed as follows:

- Rinse the pump with fresh, lukewarm water for about 30 minutes. To do so, place the suction lances into a pail filled with tap water and start a manual dosing.
- Ensure that the system is fully disconnected from the power grid. This prevents the pump from switching on during the maintenance procedure.
- Lift the blue covers from the pumps and remove the suction and pressure hoses.
- Press the band together at the recessed grips and turn the catch clockwise all the way.
- Move both hose ends outward and remove the band with the hose.
- Pull the old hose out of the two guides and insert the new hose.
- To mount the hose band and hose, proceed in reverse order. Ensure that the hose is firmly seated in the guides and that the catch has engaged.
- As soon as all connections have been closed, you can purge the air from the dosing hose. To do so, connect Pool Relax with the mains and start a manual dosing.

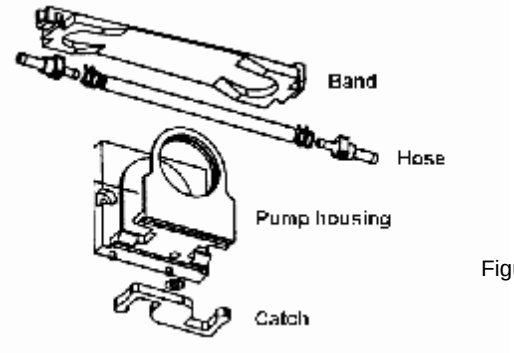


Figure: Top of the pump

3.3 Electrode Information

The electrodes must be replaced annually or earlier if worn. Use original replacement electrodes only. They can be obtained from your swimming pool dealer.

3.3.1 Electrode Wear

The following conditions, among others, indicate that the electrodes are worn:

- During calibration, the electrode takes unusually long to reach the value of the buffer solution.
- The electrode offset during calibration is too large.
- The KCL solution in the electrode shaft is used up or discoloured.

	ATTENTION: Electrodes wear very rapidly if there is an electric potential in the pool water!

3.3.2 Electrode Care

- The pH-sensitive membrane glass must be handled with care and protected against damage.
- The inner reference solution in the glass electrode must cover the inner surface of the membrane glass. Any air bubbles are removed by gently shaking the electrode vertically (like shaking a medical thermometer).

Contamination deposited on the surface of the membrane glass must be removed by carefully wiping it with a moist paper towel. Alternatively, you can use the supplied electrode cleaning solution.

3.3.3 Calibrating Electrodes

Notes on calibrating electrodes can be found in the corresponding chapters and in the calibration examples.

3.4 Decommissioning / Winter Storage of the System

If the system is put out of operation for lengthy periods, e.g. for winter storage, certain precautionary measures need to be taken. In particular, it is very important that the entire system is protected against freezing temperatures and humidity.

Dosing System

- Rinse the pump with fresh, lukewarm water for about 30 minutes. To do so, place the suction lance into a pail filled with tap water and start a manual dosing.
- Ensure that the system is fully disconnected from the power grid.
- Release the hose set to prevent permanent deformation.

Measuring System

- Store the electrodes in an upright position in the containers in a location where temperatures will not drop below zero. The three molar KCL solution in the containers protects the electrodes from drying out.
- Close both electrode drill holes of the measurement cell with the supplied cover screws.
- Let the water drain from the measurement chamber and measurement lines.

4 Operating Pool Relax

4.1 Overview of Features

4.1.1 Display and Operation

- 4-line multifunctional LC display, bluemode (4 x 20 characters)
- Simple 6-key operation
- Clear menu structure
- Menus can be displayed in a variety of selectable languages

4.1.2 Measuring and Control

- Proportional control for all control modules
- All important control parameters can be programmed individually for each control module (setpoint, maximum dosing time, proportional range, dead zone (pH), basic dose (mV), minimum switched-on/switched-off time)
- Continuous display of current dosing rate
- Conversion of all measurements by high resolution 10-bit analogue/digital converters
- 1- or 2-point calibration for pH measurements
- 1-point calibration of mV and T measurements

4.1.3 Safety Functions

- Comprehensive monitoring and alarm functions

  (upper and lower threshold alarms, flow alarm, level alarms, dosing time alarms, calibration time alarms, battery alarm, power-on delay, automatic blocking of dosing during critical alarm conditions and during power-on delay, alarm notification through

  - Ø display
  - Ø acoustic alarm signal
  - Ø potential-free relay for external alarm outputs
- continuous monitoring of the correct program sequence and automatic reset in the event of an error (watchdog function)
- Double dosing pump lock
  Pool Relax is equipped with a double pump lock that offers a very high level of safety.
  The flow switch in the measurement cell ensures that the dosing pumps can only be switched on if a sufficient amount of water is flowing through the measurement cell.
  In addition, the dosing pumps are supplied with the line voltage through a separate power supply. The power supply must be switched in such a manner that the dosing pumps are only supplied with current when the circulating pump is running.
  In this way, dangerous dosing into stationary water is prevented even if one of the two fuses should blow due to external causes.
- Alternating switching on of the dosing pumps
  As soon as a dosing pump starts running, the other pump is blocked. This prevents the agents for raising or lowering the pH from being dosed together with the water disinfection agent (ChloriLiquid or BayroSoft). Because perfect water disinfection is only possible at a pH value of 7.2, dosing of the agents for raising and lowering the pH takes precedence over dosing of the water disinfection agent.

	**ATTENTION:** pH-Minus and ChloriLiquid should never come into contact with each other – Danger of chlorine gas!

4.2 Operating principles

Illustration of
Pool Relax Chlorine

4.2.1 Keys

Pool Relax is operated entirely on 6 keys. They are integrated in the front membrane of the device.

4.2.2 Cursor

Certain elements within the display pages can be selected using a cursor (underscore) that can be moved using the ⇩, ⇧, ⇦ and ⇨ keys.

The cursor also indicates whether the device is in Normal Mode or in Entry Mode. Entry Mode is indicated by flashing of the cursor. In Entry Mode, the parameter currently selected can be adjusted.

4.2.3 Scrolling

If a display page consists of more than four lines, you can scroll using the ⇩ / ⇧ keys.

4.2.4 Making Entries

The ⇧, ⇩, ⇦, ⇨ keys are used to navigate on a display page.

The OK key confirms an entry and the ESC key is used to leave individual settings and menu items/levels.

Entries are made in several consecutive steps that are described below.

1. **Selecting the Element to Be Entered**

   Using the ⇧ / ⇩ keys (line up / down) and ⇦ / ⇨ (left / right), the cursor is first positioned on the element to be adjusted.

2. **Activating the Entry Mode**

   Entry Mode is activated by pressing the OK key. Entry Mode is indicated by flashing of the cursor.

3. **Entry**

   In Entry Mode, the selected setting can be changed using the ⇧ and ⇩ keys. To enter multiple digits, the digits can be selected using the ⇦ and ⇨ keys.

4. **Quitting Entry Mode**

   Entry Mode is quit by pressing the key again. The cursor stops flashing and the newly set value is adopted.

4.2.5 Additional Operating Functions

- Acknowledge an active alarm on the alarm page with .
- Change to a lower menu level (e.g. from the Customer Level menu) by selecting the desired submenu using / and confirm with .
- Change from a lower menu level (Customer or Factory Level) to the next highest level using .

4.3 Menu Structure

The Pool Relax menu structure is restricted to three levels to permit a rapid and intuitive navigation through the levels.

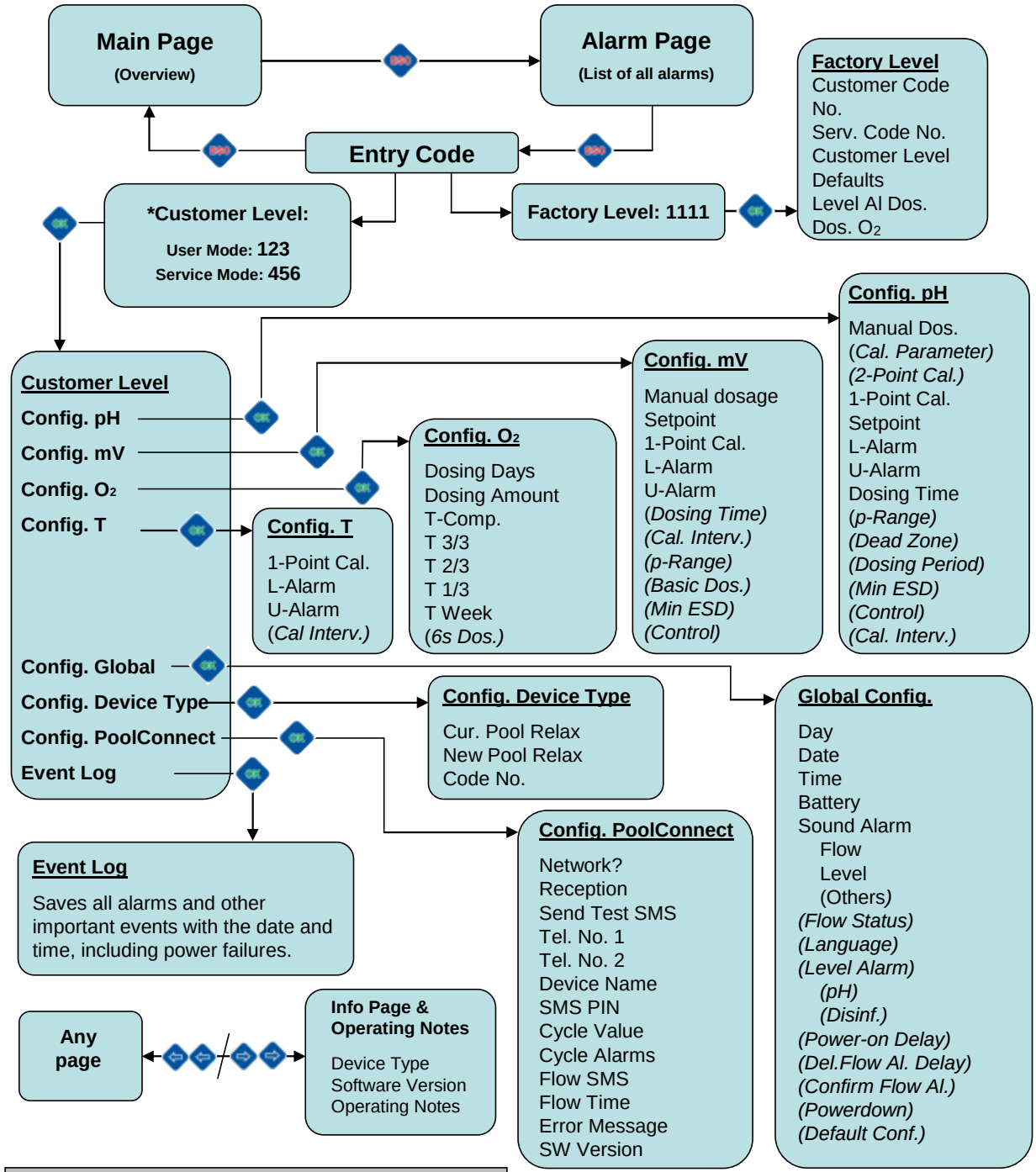
- **Main Menu Level**
  - Ø Display of all current measuring and control parameters
  - Ø Switching the operating mode of the individual modules
  - Ø Display of all current alarms
  - Ø Acknowledging of alarms
  - Ø Entry of code numbers to open the Customer or Factory Level
- **Customer Level**
  Pool Relax supports two different operating modes at the Customer Level. In the User Mode (password: 123), only the most important setting parameters are available.
  In the Service Mode (password: 456), all parameters are available.
  - Ø Configuration of all measuring and control parameters
  - Ø Calibration of measurement value collection
  - Ø Display of event log

  The password entry for the Customer Level can be deactivated at the Factory Level. In addition, the passwords can be changed there.
- **Factory Level** – (password: 1111)
  Configuration of several device parameters, e.g. the code number of the Customer Level, in production and in service.

In addition, a page is available containing information such as the device type, the software version and operating notes. It can be activated from any other page at any time by a double click left/right.

NOTE: The parameter settings in the individual menus are the basis for the correct and safe operation of the system. They should only be changed by trained technicians.

Overview of Menu Structure



Abbreviations:	
Acoust. = Acoustic	Comp. = Compensation
Al. = Alarm	Conf. & Config. = Configuration
Dos.= Dosing	Min = Minimum
Disinf. = Disinfection	No. = Number
ESD = Switched-on time	Ackn. = Acknowledge
Interv. = Interval	Serv. = Service
Cal. = Calibration	Tel. = Telephone
	T & Temp. = Temperature
	Del. = Delay

*Remark:
All parameters printed in *italics* and set in brackets are only available in the Service Mode at the Customer Level, not in the User Mode.

5 General Functions

This chapter describes general functions that do not vary with the device type:

5.1 Entry Code Number

The setting parameters in the Customer or Factory Level can only be changed after the correct code number has been entered.

Entry of the code number for the Customer Level can be fully deactivated (Factory Level).

The Customer or Factory Level is activated after entering the correct code number and confirming with  .

5.2 Customer Level

Important:

- Pool Relax offers two operating modes at the Customer Level. In the User Mode, only the most important setting parameters are available. This keeps the Customer Level compact and manageable. In the Service Mode, the user has access to all available parameters.
  Depending on the code number entered, the customer level is activated in the User Mode or in the Service Mode. If desired, entry of the code number can be deactivated at the Factory Level.
- While the Customer Level is active, dosing is blocked for all modules.
  After quitting the Customer Level, the device returns to normal operation.
- If no key is pressed for 10 minutes at the Customer Level, the Customer Level is closed automatically and the device returns to normal operation. In this case, incomplete entries are rejected.

5.2.1 Configuration Menus

After the Customer Level is activated, a selection menu appears from which you can navigate to the configuration menus for the modules contained in the device type you have.

In addition, you can navigate to the global configuration, the device type configuration and the event log.

5.2.2 Global Configuration

On the Global Configuration entry page, you can set all operating parameters that are not associated with a specific module (pH, mV, T) but that have a more global character.

Line	Content	Value range	Default	Unit	Adjustable
1	Global config.	Headline			No
2	Day	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday / Sunday	-		Yes
3	Date	dd.mm.yyyy	-		Yes
4	Time	hh:mm:ss	-		Yes
5	Battery	0.0 ... 3.5	-	V	No
6	Acoust. alarm	Headline			No
7	Flow	Active / inactive	Inactive		Yes
8	Level	Active / inactive	Active		Yes
9	Others	Active / inactive	Active		Yes
10	Flow status	On / off	-		No
11	Language	German / English / Francais / Italiano / Espanol / Russian / Polski / Greek / Menu	German		Yes
12	Level alarm	Headline			No
13	pH	Active / inactive	Active		Yes
14	Disinf.	Active / inactive	Active		Yes
15	Power-on delay	01 ... 30	05	Min	Yes
16	Confirm flow al.	Auto / manual	Auto		Yes
17	Powerdown	Active / inactive	Active		Yes
18	Default conf.	OK	-		Yes

Day (line 2)

Setting of the current day of the week.

Date (line 3)

Setting of the current date in the format of Day.Month.Year.

Time (line 4)

Setting of the current time in the format of Hours:Minutes:Seconds.

Battery (line 5)

Display of the current voltage of the internal 3V buffer battery for the real-time clock.

If the battery voltage falls below 2.8 V, Pool Relax triggers a Battery Alarm. In this case, the battery (CR 2032) must be replaced immediately.

Sound Alarm Flow (line 7)

Activation or deactivation of the sound alarm in the event of a Flow Alarm.

Sound Alarm Level (line 8)

Activation or deactivation of the sound alarm in the event of a Level Alarm.

Sound Alarm Others (line 9)

Activation or deactivation of the sound alarm in the event of other alarms.

Flow Status (line 10)

Display of the current status of the flow signal for testing and adjustment purposes (on / off).

Language (line 11)

Setting of the desired menu language. If the "Menu" setting is activated, a language selection menu appears the next time you switch on the device.

Level Alarm pH (line 13)

Activation or deactivation of the level alarm pH.

When the alarm is deactivated, the pH level input is not monitored. In this case, no acoustic alarm is issued, no matter what the "Sound Alarm" setting.

Level Alarm Disinf. (line 14)

Activation or deactivation of the disinfectant level alarm (mV or O_2, depending on the device type).

When the alarm is deactivated, the disinfectant level input is not monitored. In this case, no acoustic alarm is issued, no matter what the "Sound Alarm" setting.

Power-on Delay (line 15)

When the controller and the circulating pump are switched on, dosing remains blocked for all modules for a certain time, permitting measurements to stabilise and thus ensuring that the system will operate correctly.

Confirm Flow Alarm (line 16)

Here you can define how Pool Relax is to handle a Flow Alarm:

Manual

In the "Manual" setting, the Flow Alarm is treated as an error status. The Flow Alarm is not cleared until the Flow Signal reappears ***and*** the user acknowledges the Flow Alarm on the device.

Auto

In the "Auto" setting, the Flow Alarm is treated as a normal operating status. For example, this is useful in applications in which the circulating pump is switched off at regular intervals. The Flow Alarm is cleared automatically when the Flow Signal reappears.

Powerdown (line 17)

The Powerdown function can be activated or deactivated here: If no key is pressed for 15 minutes, the screen illumination switches off (energy-saving mode).

Default Configuration (line 18)

Here, *all* parameters can be reset to their default values. This does not affect the Type of Device, Date and Time.

5.2.3 Device Type Configuration

On the "Config. Device Type" entry page, Pool Relax can be set to another treatment type if desired. You can select between Pool Relax O_2 (oxygen), Cl (chlorine) and Br (bromine).

	**ATTENTION:** A change in the device type is a major intervention in the entire pool treatment system and may only be performed by experienced experts!

Additional information on changing the configuration of the device type can be found in the manuals on the optionally available changeover sets.

5.2.4 PoolConnect Configuration

PoolConnect can be used with Pool Relax as an option. It enables the useful communication of Pool Relax with up to two mobile phones.

Details on installing and configuring PoolConnect can be found in the documentation on the device or on the BAYROL homepage.

5.2.5 Event Log

The Event Log is used to monitor the device functions and provides support in the analysis of any problems that may arise. It provides an overview of all important events that occurred while the device was operating. Every event is provided with a time stamp (date and in some cases the time).

The following information is recorded: Switching the device on and off or mains power failure, software reset (Watchdog), low-voltage reset (Power Fail), dosings carried out and not carried out (for the O_2 version of Pool Relax only), completed calibrations (for all control modules), Level Alarms and Dosing Time Alarms (start and end).

5.3 Info Page and Operating Notes

The Info Page with Operating Notes can be called up *at any time* using  or  .
This page provides the user with information on the device type, the software version and instructions on how to operate the device.

5.4 Factory Level

Important:

- While the Factory Level is active, dosing is blocked for all modules.
  After quitting the Factory Level, the device returns to normal operation.
- If no key is pressed for 10 minutes at the Factory Level, the Factory Level is closed automatically and the device returns to normal operation. In this case, incomplete entries are rejected.

Line	Content	Value range	Unit	Adjustable
1	Factory Level	Headline		No
2	Customer Code No.	000 ... 999		Yes
3	Serv. code no.	000 ... 999		Yes
4	Customer Level	Code / User / Serv.		Yes
5	Defaults	Europe / UK / FR / ESP / CH		Yes

Customer Code Number (line 2)

Setting of the three-digit customer code number that must be entered to activate the Customer Level in the User Mode.

Service Code Number (line 3)

Setting of the three-digit service code number that must be entered to activate the Customer Level in the Service Mode.

Customer Level (line 4)

This setting defines how the Customer Level is to be activated.

There are three available settings:

1. Code

The three-digit code number is requested when you call up the Customer Level. Depending on what number is entered, the Customer Level is started in the User Mode or in the Service Mode.

2. User

The Customer Level is always started in the User Mode without requiring a code number.

3. Service

The Customer Level is always started in the Service Mode without requiring a code number.

Defaults (line 5)

A hardware reset or a default reset (see also "Service Mode, Global Configuration, Default Conf.") resets all parameters to their default values. Five different country-specific sets of default parameters can be pre selected.

6 Alarms

6.1 Overview

Pool Relax has various alarm functions. Alarms are indicated as follows:

- Flashing headlines (pH, mV, T, O_2) on the Overview page
- Display of alarms on the alarm page
- Automatic switching to the alarm page when a new alarm occurs
- Acoustic alarm signal in the Pool Relax device (can be deactivated)
- Potential-free alarm connection for connecting external modules for signalling or recording alarms

When an alarm occurs, the affected dosing (e.g. pH-side) is blocked. Details are provided in the following sections.

The following alarms are supported (the affected modules are shown in brackets):

- Measurement Alarm - upper limit alarm (pH, mV, T)
- Measurement Alarm - lower limit alarm (pH, mV, T)
- Flow Alarm (global)
- Power-on Delay (global)
- Level Alarm (pH, disinfection (mV / O_2))
- Dosing Time Alarm (pH, mV)
- Calibration Time Alarm (pH, mV, T)
- Battery Alarm (global)

Power-on Delay (after the device is switched on or after a Flow Alarm) is not an alarm in the true sense of the term. However, because it is similar to an alarm in that it blocks dosing, it is included in this chapter.

6.2 Alarm Status

Every alarm can have one of the following states:

Status	Signalling
Inactive	Line is not displayed
Active, not acknowledged	Line flashes, flashing stops upon acknowledge
Active, acknowledged	Line does not flash
Inactive, not acknowledged	Line flashes, display disappears upon acknowledge

Triggering conditions, release conditions and alarm delays for the individual alarms are specified in the following sections. An alarm is acknowledged by the user on the "Alarm" page.

6.3 Signalling

6.3.1 Flashing Headlines

Alarms with the "active, not acknowledged" status are indicated in part by flashing module headlines (pH, mV, T, O_2) on the Overview page. Flashing stops as soon as the alarm becomes inactive or is acknowledged.

6.3.2 Automatic Activation of the Alarm Page

Alarm monitoring is interrupted while the user is at the Customer Level or Factory Level. Thus, the system does not automatically switch to the alarm page. When the user leaves the Customer Level or Factory Level, alarm monitoring is resumed and the alarm page is activated if new alarms occurred.

6.3.3 Alarm Page

- Alarms are displayed in the order in which they occurred, with the most recent alarm appearing at the top of the list.
- An alarm can be acknowledged by selecting the alarm and pressing the  button. If it has already become inactive, it disappears from the list completely. Otherwise, it just stops flashing.

Number of alarms (line 1)

The number of active alarms is displayed in the first line. This also includes alarms that have become inactive but have not yet been acknowledged. The Power-on Delay is *not* included here.

Power-on Delay (line 2)

Line 2 displays the remaining power-on delay in minutes.

By moving the cursor to the "Power Delay" line and pressing "OK", the Power-on Delay ends immediately and the line disappears from the list. If the Power-on Delay is not running, the corresponding line disappears from the alarm page At the end of the Power-on Delay, the system switches automatically from the Alarm page to the Overview page, as long as there are no additional alarms pending.

6.3.4 Acoustic Alarm Signal

In the Global settings at the Customer Level, the acoustic alarm signal can be activated or deactivated independently for the Flow Alarm, all Level Alarms (pH and disinfection (mV / O_2)) and all other alarms.

6.3.5 Blocking of Dosing

Generally, dosing is only blocked when the corresponding alarm is active, no matter if it is quit already or not. The Flow Alarm is an exception: If "Conf. Flow Alarm" is set to "manual", blocking is not cancelled until the Flow Alarm becomes inactive *and* is acknowledged by the user.

6.3.6 Potential-free Alarm Relay

Pool Relax is equipped with a potential-free alarm relay for connecting external components for signalling or recording of alarms.
The connection of the potential-free relay is described in the Appendix.

7 pH Measuring and Control Module

This measuring and control module is a component of all Pool Relax versions.

7.1 pH Overview Page

Details on the individual parameters can be found in the following overview.

Line	Content	Value range	Default	Unit	Adjustable
1	pH	Headline			No
2	Actual value	0.00 to 10.00	-	pH	No
3	Operating mode	Off / Auto / Manual+ / Manual-	Off		Yes
4	Dosing rate	-100 ... 100[1)] according to dosing direction	-	%	No

1) The value range is restricted as follows, depending on how the Control parameter is configured at the Customer Level (Config. pH):
- D+ 0 ... 100 %
- D- -100 ... 0 % %

Actual Value (line 2)

Display of current pH reading.

Operating Mode (line 3)

The operating mode of the pH control is set here. The individual settings have the following meaning:

Off

The pH control is switched off completely, i.e. dosing does not occur.
The displayed dosing rate value (line 4) is always equal to 0 %.

Auto

pH control is active. The pH controller calculates the dosing rate on the basis of the difference between the programmed setpoint and the actual value, and on the basis of the control parameters set at the Customer Level (Config. pH). Dosing may be blocked by alarms.

Manual+

In this operating mode, the dosing rate is a constant +100 %, i.e. the pH value is raised with the maximum dosing rate.

The Manual+ setting is only available if the Control parameter (Config. pH) is configured to D+ at the Customer Level, i.e. pH control is operating to raise the pH.

Dosing may be blocked by alarms.

Manual-

In this operating mode, the dosing rate is a constant -100 %, i.e. the pH value is lowered with the maximum dosing rate.

The Manual- setting is only available if the Control parameter (Config. pH) is configured to D- at the Customer Level, i.e. pH control is operating to lower the pH.

Dosing may be blocked by alarms.

Dosing Rate (line 4)

Display of the current dosing rate in percent. A value of 0 % means that dosing is not taking place. A value of +100 % means that the pH value is being raised using the maximum dosing rate. A value of -100 % means that the pH value is being lowered using the maximum dosing rate.

While dosing is blocked by alarms, the displayed dosing rate equals 0 %.

7.2 pH Configuration

On the Config. pH page at the Customer Level, you can configure all parameters of the pH control.

The following pages provide a detailed description of the individual parameters.

Line	Content	Value range	Default	Unit	Adjustable
1	Config.pH	Headline			No
2	Manual dosage	1…240	20	Min	Yes
3	Cal. parameter	Calls up the Cal. Parameter submenu			-
4	2-point cal.	Calls up the 2-Point-Cal. submenu			-
5	1-Point Cal.	Calls up the 1-Point-Cal. submenu			-
6	Setpoint	0.00 to 10.00	7.20	pH	Yes
7	L-alarm	0.00 to 10.00	6.80	pH	Yes
8	U-alarm	0.00 to 10.00	7.60	pH	Yes
9	Dosing Time	000 ... 999	120	Min	Yes
10	p-range	00.0 ... 99.9	10.0	%	Yes
11	Dead zone	±0.0 ... ±9.9	0.0 (off)	pH	Yes
12	Dosing period	010 to 599	060	s	Yes
13	Min ESD	1 to 9	3	s	Yes
14	Control	D+ / D-	D-	-	Yes
15	Cal. interv.	0 ... 99	0 (off)	Days	Yes

Manual Dosing (line 2)
Here you can configure the duration of the manual dosing.

Setpoint (line 6)
Here you can configure the setpoint of the pH control.

Lower Alarm Threshold (line 7)
Here you can set the lower alarm threshold of the pH measurement.
If the pH value drops below the alarm threshold set here, an L-alarm is output.

Upper Alarm Threshold (line 8)
Here you can set the upper alarm threshold of the pH measurement.
If the pH value rises above the alarm threshold set here, a U-alarm is output.

Maximum Dosing Time (line 9)
Here you can configure the time after which a Dosing Time Alarm is triggered if the control is not able to reach the setpoint despite dosing continuously.

0	Min	Dosing Time Alarm inactive.
001...999	Min	Dosing Time Alarm is triggered after the preset time.

The value '0' can be set in order to deactivate the Dosing Time Alarm.

ATTENTION: It is strongly recommended not to switch off the dosing time limit, as doing so deactivates an important safety feature.!

Proportional Range (line 10)

Here you can set the Proportional Range of the pH control. The percentage value entered refers to the full range of pH measurements, i.e. to 10.00 pH. A p-range of 50 % corresponds to pH 5.00 and a p-range of 15 % corresponds to pH 1.5.

As long as the control deviation between setpoint and actual value lies within the proportional range, the pH controller calculates the dosing rate in proportion to the control deviation, so that, at the limit of the proportional range, the dosing rate is 100 %. In the middle of the p-range, for example, the dosing rate equals 50 %. Outside of the p-range, dosing is always carried out at the maximum rate of 100 %.

Dead Zone (line 11)

The Dead Zone for the pH controller is set here. As long as the control deviation between setpoint and actual value lies within the Dead Zone, control remains inactive, i.e. there is no dosing. The control only starts dosing again when the control deviation moves outside the Dead Zone. When the reading moves (back) into the Dead Zone, the control remains active until the actual value reaches the setpoint.

Dosing Period (line 12)

The Dosing Period (or dosing cycle) for pH control is programmed here. Since the control uses pulse width modulation, the dosing period (i.e. the sum of the switched-on and switched-off time of the dosing relay) remains constant.

The actual dosing rate is obtained from the variation in the ratio between the switched-on time and the switched-off time.

Minimum Dosing Time (line 13)

This sets the minimum time for which a dosing relay (and thus the dosing pump or dosing valve) may be switched on or off.

If the current calculated dosing rate results in a switched-on time below the set value, dosing continues at the rate obtained from the minimum switched-on time until the programmed setpoint is reached. Once the setpoint is reached, the dosing rate is set to 0 %. If very high dosing rates result in a switched-off time below the set figure, dosing is not switched off - i.e. dosing is set to 100 %.

Dosing Direction of Control (line 14)

pH control is able to use 1 dosing relay to control a pH-increasing dosing device (D+) as well as a pH-reducing dosing device (D-). The configuration used must be set here:

D+	Only a dosing device to increase pH is connected. The pH control operates in one direction only to increase the pH level.
D-	Only a dosing device to reduce pH is connected. The pH control operates in one direction only to reduce the pH level.

Calibration Interval (line 15)

This is used to set the time after which a Calibration Alarm is triggered. The time begins after each successfully completed calibration. The value "0" can be entered to deactivate the Calibration Time Alarm.

0	Days	Calibration Time Alarm inactive.
01...99	Days	Calibration Time Alarm is triggered after the preset time.

	**NOTE:** It is recommended that the electrodes be calibrated on a quarterly basis, i.e. after approx. 90-93 days!

7.3 pH Calibration

Calibration is used to compensate for measurement tolerances and should be performed on a quarterly basis.

Either 1-point or 2-point calibration can be performed.

In addition, the Cal. Parameters submenu displays the current calibration parameters and allows for manual changes of these values.

Calibration examples can be found in the Appendix of this manual.

7.3.1 1-Point Calibration pH

Line	Content	Value range	Default	Unit	Adjustable
1	1-point cal. pH	If "OK" is selected, 1-point calibration is carried out. The calibration value and the slope of the electrode must be entered correctly beforehand			
2	Cal. value	0.00 to 10.00	0.00	pH	Yes
3	Current value	0.00 to 10.00	-	pH	No
4	Electrode	50.0 ... 70.0	59.6	mV/pH	Yes

1-Point pH Calibration (line 1)

1-point calibration is started by moving the cursor to line 1 and pressing the  key.

Calibration Value (line 2)

The pH value of the buffer solution used for 1-point calibration is entered here.

Current Value (line 3)

The current pH reading is displayed here. Before calibration is carried out, the value displayed is based on the parameters calculated at the previous calibration.

After calibration has been completed, the newly calculated parameters are used. The measured value displayed should now no longer (or only slightly) differ from the calibration value entered for the buffer solution.

Electrode Slope (line 4)

The electrode slope of the pH electrode is entered here. This value should be obtained from the manufacturer's data for the pH electrode.

Before any adjustment is made, the value displayed represents the current valid value from the previous calibration.

1-Point pH Calibration - Errors

A Calibration Error is displayed if the calculated values are not within the following limits:

Parameter	Permitted min. value	Permitted max. value	Unit
$Offset_{pH}$	-1.00	1.00	pH

The offset is the deviation between the value calculated by the device (without any corrections) and the real pH value. This deviation must not be greater than 1 pH, otherwise a calibration error is signalled and the calibration is not accepted.

	**NOTE:** If the offset is greater than +/- 1 pH, it is likely that there is a problem with the measurement itself, e.g. the pH electrode is defective or the buffer solution does not have the specified pH value.

7.3.2 2-Point Calibration

The 2-point calibration consists of three consecutive steps.

Step 1 – Upper calibration point

Line	Content	Value range	Default	Unit	Adjustable
1	2-Point Cal. pH-U	If "OK" is selected, the first step of 2-point calibration is carried out (upper calibration point).			
2	Upper (U) cal. value	0.00 to 10.00	0.00	pH	Yes
3	U measurement	0.00 to 10.00	-	pH	No
4	Signal	-420 ... +180	-	mV	No

2-Point pH-U Calibration (line 1)

The first step of the 2-point calibration (upper calibration point) is performed by moving the cursor to line 1 and pressing the key. The correct upper calibration value must be entered first.

Upper Calibration Value (line 2)

Enter the pH value of the buffer solution used for the first step of the 2-point calibration at the upper calibration point. This figure must be as accurate as possible. Typically, a pH 9 buffer solution is used.

Current Value (line 3)

The current pH reading is displayed here. Before calibration is carried out, the value displayed is based on the parameters calculated at the previous calibration.

Signal (line 4)

This is the voltage signal provided by the pH measurement cell, which is displayed to support problem analysis in case of calibration problems. The signal should be around 0mV for pH 7. For pH values less than 7, the signal enters the negative range at approx. 60mV/pH, and for pH values greater than 7 it moves into the corresponding positive range. For example, for pH 9 the displayed signal should be around 120mV, and for pH 5 it should be around -120mV.

NOTE: If the displayed values differ significantly from these rules, there is probably a problem concerning the pH measurement itself, e.g. a defective pH electrode.

Step 2 – Lower calibration point

After the first step at the upper calibration point has been completed, the page for carrying out the second step is displayed:

Line	Content	Value range	Default	Unit	Adjustable
1	2-Point Cal. pH-L	If "OK" is selected, the second step of the 2-point calibration is carried out (lower calibration point).			
2	L-cal. value	0.00 to 10.00	0.00	pH	Yes
3	L-current value	0.00 to 10.00	-	pH	No
4	Signal	-420 ... +180	-	mV	No

2-Point pH-L Calibration (line 1)

The second step of the 2-point calibration (lower calibration point) is performed by moving the cursor to line 1 and pressing the key. The correct lower calibration value must be entered first.

Lower Calibration Value (line 2)

Enter the pH value of the buffer solution used for the second step of the 2-point calibration at the lower calibration point. Typically, a pH 7 buffer solution is used.

Current Value (line 3)

Display of current pH reading. Before calibration is carried out, the value displayed is based on the parameters calculated at the previous calibration. After calibration has been completed, the newly calculated parameters are used. The measured value displayed should now no longer (or only slightly) differ from the calibration value entered for the buffer solution.

Signal (line 4)

Display of the measured voltage signal as described above.

Step 3 – Display of the calculated calibration parameters

After execution of the second step of the calibration at the lower calibration point, the calculated parameters are displayed for verification:

Line	Content	Value range	Default	Unit	Adjustable
1	2-point cal. pH	OK -> Acceptance of the displayed calibration parameters ESC -> Cancellation without accepting the calculated parameters			
2	Electrode	50.00 ... 70.00	-	mV/pH	Yes
3	Offset	-1.00 ... +1.00	-	pH	Yes
4	Current value	0.00 ... 10.00	-	pH	No

2-Point pH Calibration (line 1)

The displayed calibration parameters (electrode slope and offset) are activated by moving the cursor to line 1 and pressing the  key.

If the values should not be activated, the calibration can be aborted with  .

Electrode (line 2)

Slope of the pH electrode calculated during the calibration. This value can be changed manually. However, this should only be performed by experienced experts.

Offset (line 3)

The offset is the deviation between the value calculated by the device (without any corrections) and the real pH value entered by the user during calibration. The offset is calculated during calibration. This value can be changed manually. However, this should only be performed by experienced experts.

Current Value (line 4)

The current pH reading is displayed here. This value changes if the offset or electrode slope is modified since it is calculated on the basis of the current parameters.

2-point pH Calibration - Errors

A Calibration Error is displayed if the calculated values are not within the following limits:

Parameter	Permitted min. value	Permitted max. value	Unit
$Offset_{pH}$	-1.00	1.00	pH
Electrode slope S_{pH}	50.0	70.0	mV/pH

As for the 1-point calibration, the deviation between the calculated (uncorrected) measurement and the actual pH value must be less than 1 pH.

The slope of the pH electrode, which is calculated during calibration, must be in the range from 50.0 to 70.0 mV/pH.

If one of these two conditions is not fulfilled, a calibration error is signalled and the calibration is not accepted.

7.3.3 Manual Setup of the Calibration Parameters

The Cal. Parameters submenu at the Customer Level has the following contents:

Line	Content	Value range	Default	Unit	Adjustable
1	Cal. parameter pH	OK -> Acceptance of the displayed calibration parameters ESC -> Cancellation without accepting the calculated parameters			
2	Electrode	50.00 ... 70.00	-	mV/pH	Yes
3	Offset	-1.00 ... +1.00	-	pH	Yes
4	Current value	0.00 ... 10.00	-	pH	No

This menu allows verification and manual correction of the calculated calibration parameters (electrode and offset). For better control, the current value is continuously updated while the parameters are being manually modified.

Cal. Parameter pH (line 1)

The displayed calibration parameters (electrode slope and offset) can be activated by moving the cursor to line 1 and pressing the  key.

If the value should not be activated, the calibration can be aborted using  .

Electrode (line 2)

Slope of the pH electrode calculated during the calibration. This value can be changed manually. However, this should only be performed by experienced experts.

Offset (line 3)

The offset is the deviation between the value calculated by the device (without any corrections) and the real pH value entered by the user during calibration. The offset is calculated during calibration. This value can be changed manually.

Current Value (line 4)

The current pH reading is displayed here. This value changes if the offset or electrode slope is modified since it is calculated on the basis of the current parameters.

ATTENTION: Manually setting the calibration parameters requires extensive experience and knowledge and should therefore only be performed by experienced experts.

8 Redox Measuring and Control Module (mV)

This measuring and control module is contained in Pool Relax Chlorine and Pool Relax Bromine.

Please note:

The redox measurement is different from a free chlorine measurement. The redox value is a measure of the ratio of oxidation agent to reduction agent in the pool water. A redox value cannot be associated with a specific chlorine or bromine value. It is therefore advisable to bring the swimming pool water to a chlorine value of 0.6 mg/l (bromine value of 2-4 mg/l) and to use the redox value resulting from the calibrated electrode as the setpoint.

Because the chemical composition of the pool water changes over time, this setpoint definition should be repeated every time the redox electrode is calibrated.

8.1 Redox Overview Page (mV)

Details on the individual parameters can be found in the following overview.

Line	Content	Value range	Default	Unit	Adjustable
1	mV	Headline			No
2	Actual value	0 ... 1000	-	mV	No
3	Operating mode	Off / Auto / Manual+	Off		Yes
4	Dosing rate	0 ... 100	-	%	No

Actual Value (line 2)

Display of current mV reading.

Operating Mode (line 3)

The operating mode of the mV control is set here. The individual settings have the following meaning:

Off

The mV control is switched off completely, i.e. dosing does not occur.
The displayed dosing rate value (line 4) is always equal to 0 %.

Auto

mV control is active. The mV controlller calculates the dosing rate on the basis of the difference between the programmed setpoint and the actual value, and on the basis of the control parameters set at the Customer Level (Config. mV).

Dosing may be blocked by alarms.

Manual+

In this operating mode, the dosing rate is a constant +100 %, i.e. the mV value is raised using the maximum dosing rate.

Dosing may be blocked by alarms.

Dosing Rate (line 4)

The current dosing rate is displayed as a percentage.

A value of 0 % means that dosing is not taking place. A value of +100 % means that the mV value is being raised using the maximum dosing rate.

While dosing is blocked by alarms, the displayed dosing rate equals 0 %.

8.2 Redox (mV) Configuration

On the Config. mV page at the Customer Level, you can configure all parameters of the mV control. The setting parameters affect the following areas:

Alarm thresholds for threshold alarms, control and 1-point calibration parameters

Line	Content	Value range	Default	Unit	Adjustable
1	Config. mV	Headline			No
2	Manual dos.		20	min	Yes
3	Setpoint	0.00 ... 1000	600	mV	Yes
4	1-Point Cal.	Calls up the 1-Point-Cal. submenu			-
5	L-alarm	0.00 ... 1000	500	mV	Yes
6	U-alarm	0.00 ... 1000	800	mV	Yes
7	Dosing Time	000 ... 999	120	Min	Yes
8	Cal. interv.	0 ... 99	0 (off)	Days	Yes
9	p-range	00.0 ... 99.9	10.0	%	Yes
10	Basic dosing	00.0 ... 49.9	0 (off)	%	Yes
11	Dosing period	010 to 599	060	s	Yes
12	Min ESD	1 to 9	3	s	Yes
13	Control	D+	D+	-	No

Manual Dosage (line 2)
Here you can configure the duration of the manual dosing.

Setpoint (line 3)

Setpoint configuration of the mV control.

Lower Alarm Threshold (line 5)

Setting of the lower alarm threshold of the mV measurement. If the mV value drops below the alarm threshold set here, an L-alarm is output.

Upper Alarm Threshold (line 6)

Setting of the upper alarm threshold of the mV measurement. If the mV value rises above the alarm threshold set here, a U-alarm is output.

Maximum Dosing Time (line 7)

Configuration of the time after which a Dosing Time Alarm is triggered if the control is not able to reach the setpoint despite dosing continuously. The value '0' can be set in order to deactivate the Dosing Time Alarm.

0	Min	Dosing Time Alarm inactive.
001...999	Min	Dosing Time Alarm is triggered after the preset time.

Calibration Interval (line 8)

This is used to set the time after which a Calibration Alarm is triggered. The time begins after each successfully completed calibration. The value "0" can be entered to deactivate the Calibration Time Alarm.

0	Days	Calibration Time Alarm inactive.
01...99	Days	Calibration Time Alarm is triggered after the preset time.

NOTE: It is recommended that the electrodes be calibrated on a quarterly basis, i.e. after approx. 90-93 days!

Proportional Range (line 9)

The Proportional Range of the mV control is set here. The percentage value entered refers to the full range of mV measurements, i.e. to 1000 mV. A p-range of 50 % corresponds to 500 mV and a p-range of 15 % corresponds to 150 mV. As long as the control deviation between setpoint and actual value lies within the proportional range, the mV controller calculates the dosing rate in proportion to the control deviation, so that, at the limit of the proportional range, the dosing rate is 100 %. In the middle of the p-range, for example, the dosing rate equals 50 %. Outside of the p-range, dosing is always carried out at the maximum rate of 100 %.

Basic Dosing (line 10)

Configuration of the basic dosing of the mV control. The mV controller always adds the basic dosing to the calculated dosing rate. The basic dosing compensates the natural attrition of dosed care products in the swimming pool water.

Dosing Period (line 11)

The Dosing Period (or dosing cycle) for mV control is programmed here. Since the control uses pulse width modulation, the dosing period (i.e. the sum of the switched-on and switched-off time of the dosing relay) remains constant. The actual dosing rate is obtained from the variation in the ratio between the switched-on time and the switched-off time.

Minimum Dosing Time (line 12)

This sets the minimum time for which a dosing relay (and thus the dosing pump or dosing valve) may be switched on or off. If the current calculated dosing rate results in a switched-on time below the set value, dosing continues at the rate obtained from the minimum switched-on time until the programmed setpoint is reached. Once the setpoint is reached, the dosing rate is set to 0 %. If very high dosing rates result in a switched-off time below the set figure, dosing is not switched off - i.e. dosing is set to 100 %.

Dosing Direction of Control (line 13)

The mV controller always operates in one direction only. The D+ presetting cannot be changed.

8.3 Redox (mV) Calibration

The calibration is used to compensate for measurement tolerances.

Calibration examples can be found in the Appendix of this manual.

8.3.1 1-Point Calibration

Line	Content	Value range	Default	Unit	Adjustable
1	1-point cal. mV	If "OK" is selected, 1-point calibration is carried out. The correct calibration value must be entered first.			
2	Cal. value	0 ... 1000	0	mV	Yes
3	Current value	0 ... 1000	-	mV	No

1-Point mV Calibration (line 1)

1-point calibration is started by moving the cursor to line 1 and pressing the  key. The calibration value must be entered first.

Calibration Value (line 2)

Here the mV value (redox potential) of the reference medium (typically 465mV is used) is entered with which the 1-point calibration is to be performed.

Current Value (line 3)

The current mV reading is displayed here. Before calibration is carried out, the value displayed is based on the parameters calculated at the previous calibration. After calibration has been completed, the newly calculated parameters are used. The measured value displayed should now no longer (or only slightly) differ from the calibration value entered for the reference medium.

1-Point Redox Calibration (mV) - Error

When the calibration is performed, the calculated parameters are checked for plausibility. If the calculated offset is outside of the valid value range, a calibration error is signalled and the result of the calibration is discarded. The calibration can be repeated after the entries are corrected or the problem is eliminated. The calibration can be aborted with  .

A calibration error is signalled if the calculated value is outside of the following limits:

Parameter	Permitted min. value	Permitted max. value	Unit
$Offset_{mV}$	-100	100	mV

The offset is the deviation between the value calculated by the device (without any corrections) and the real mV value. This deviation must not be greater than
100 mV, otherwise a calibration error is signalled and the calibration is not accepted.

NOTE: If the offset is greater than +/- 100 mV, it is likely that there is a problem with the measurement itself, e.g. the redox electrode is defective or the buffer solution does not have the specified value.

9 Temperature Measurement

This measuring module is contained in Pool Relax O_2.

9.1 Temperature Overview Page

Line	Content	Value range	Default	Unit	Adjustable
1	T	Headline			No
2	Actual value	00.0 ... 49.9	-	°C	No

Actual Value (line 2)

The current temperature reading is displayed here.

9.2 Temperature Configuration

On the Config. T page at the Customer Level, you can configure all parameters of the T measurement.

Line	Content	Value range	Default	Unit	Adjustable
1	Config. T	Headline			No
2	1-Point Cal.	Calls up the 1-Point-Cal. submenu			-
3	L-alarm	00.0 ... 49.9	10.0	°C	Yes
4	U-alarm	00.0 ... 49.9	50.0	°C	Yes
5	Cal. interv.	0 ... 99	0 (off)	Days	Yes

Lower Alarm Threshold (line 3)

Setting of the lower alarm threshold of the temperature measurement.

Upper Alarm Threshold (line 4)

Setting of the upper alarm threshold.

Calibration Interval (line 5)

This is used to set the time after which a Calibration Alarm is triggered.

9.3 1-Point Calibration Temperature

Line	Content	Value range	Default	Unit	Adjustable
1	1-point cal. T	If "OK" is selected, 1-point calibration is carried out. The correct calibration value must be entered first.			
2	Cal. value	00.0 ... 49.9	0.0	°C	Yes
3	Current value	00.0 ... 49.9	-	°C	No

1-Point Temperature Calibration (line 1)

1-point calibration is started by moving the cursor to line 1 and pressing the key.

Calibration Value (line 2)

The temperature (temperature of pool water) of the calibration is entered here.

Current Value (line 3)

The current temperature reading is displayed here. Before calibration is carried out, the value displayed is based on the parameters calculated at the previous calibration.

1-Point Temperature Calibration - Errors

When the calibration is performed, the calculated parameters are checked for plausibility. A Calibration Error is displayed if the calculated values are not within the following limits:

Parameter	Permitted min. value	Permitted max. value	Unit
$Offset_T$	-10	10	°C

The offset is the deviation between the value calculated by the device (without any corrections) and the real temperature value. This deviation must not be greater than 5 °C, otherwise a calibration error is signalled and the calibration is not accepted.

10 O_2 Automatic Dosing System

The O_2 automatic dosing system is only contained in Pool Relax O_2.

10.1 O_2 Overview Page

Line	Content	Value range	Default	Unit	Adjustable
1	**O_2**	Headline			No
2	Dose amount (setpoint or actual value)	0.0 ... 99.9	2.0	L	No
3	Operating mode	Auto / Manualx1 / Manualx2 / Manualx3 / Stop	Auto		Yes
4	Dosing Days	" " ... "1234567"	" "		No

Dose Amount (line 2)

This displays the programmed dose for the O_2 automatic dosing system. While dosing is taking place, the amount remaining before the end of the dosage is displayed and the display flashes.

Operating Mode (line 3)

The operating mode of the O_2 automatic dosing system is set here. While the operating mode is being entered (flashing cursor), the previous setting still remains valid. The new setting is only activated after "OK" is pressed. The individual settings have the following meaning:

Auto

The O_2 automatic dosing system is active and carries out automatic dosings on the dosing days which have been programmed with active temperature compensation, additional dosings may be triggered.

Stop

The O_2 automatic dosing system is switched off. No dosing takes place. If an automatic dosing operation is interrupted by "Stop", it will continue when the system returns to automatic mode, unless the corresponding dosing day has expired in the meantime. Manual dosings are completely aborted by "Stop" and will not continue later.

Manualx1 or Manualx2 or Manualx3

When changing to the Manualx1, x2 or x3 operating mode, a dosing with the programmed dose amount multiplied by 1, 2 or 3, respectively, is started. At the end of dosing, the system automatically reverts to the previous active operating mode, "Auto" or "Stop".

Dosing Days (line 4)

The dosing days programmed at the Customer Level (Config. O_2) are displayed here. A digit appears for each programmed dosing day, as follows:

1 = Monday, 2 = Tuesday, 3 = Wednesday, ...

10.2 O_2 Configuration

On the Config. O_2 page at the Customer Level, you can configure all parameters of the O_2 automatic dosing system. In addition, the average temperature figures from the last 3 thirds of the past week as well as of the entire last week are displayed These figures are used as a basis for temperature compensation for the O_2 automatic dosing system.

Line	Content	Value range	Default	Unit	Adjustable
1	Config. O_2	Headline			No
2	Dosing Days	" " ... "1234567"	"5"		Yes
3	Dose Amount	0.0 ... 99.9	2.0	L	Yes
4	T comp.	Inactive / low / high	Active – low		Yes
5	T 3/3	00.0 ... 49.9	00.0	°C	No
6	T2/3	00.0 ... 49.9	00.0	°C	No
7	T1/3	00.0 ... 49.9	00.0	°C	No
8	T week	00.0 ... 49.9	00.0	°C	No
9	6s dos.	Active / inactive	Active		Yes

Dosing Days (line 2)

The dosing days for the O_2 automatic dosing system are programmed here. In the Entry Mode, each day can be activated or deactivated individually. It should be noted that, where temperature compensation is active, only one dosing day can be activated.

Dose Amount (line 3)

The basic dosing amount for the O_2 automatic dosing system is set here. The set amount of care product is added at each dosing, temperature-compensated if temperature compensation is active. The dosing amount for manual operation is also based on the value set here.

Temperature Compensation (line 4)

The quantity of BayroSoft to be dosed depends on the temperature of the pool water. The warmer the swimming pool water, the more BayroSoft must be added to ensure that the water will undergo the correct treatment.

The temperature compensation for the O_2 automatic dosing system can be set here.

The following points should be noted:

- Choose between low and high temperature compensation (see below).
- When temperature compensation is active, only one single dosing day can be activated.
- If several dosing days are active when temperature compensation is activated, all dosing days except the first are cancelled.

Where temperature compensation is active, a temperature-compensated main dose takes place on the programmed dosing day. In addition, two additional dosings take place – 1/3 of the week and 2/3 of the week after this main dose (56 and 112 hours). These dosings depend on the amount of the main dosing.

Average Temperature for the 3rd Third of the Week (line 5)

This display shows the average temperature for the final third of the current week (the week begins with the programmed dosing day). At the end of the week, the display is reset to 0.0°C.

Average Temperature for the 2nd Third of the Week (line 6)

This display shows the average temperature for the 2nd third of the current week.

Average Temperature for the 1st Third of the Week (line 7)

This display shows the mean value of the temperature for the 1st third of the current week.

Average Temperature for the Entire Week (line 8)

This display shows the average temperature for the whole of the week just completed. This value is updated at the end of each week. If no average value is available, the display shows 0.0°C. The temperature compensation for the main dose is calculated on the basis of the average temperature for the previous week.

Additional Dosing (for 6 seconds) (line 9)

If Additional Dosing is activated, the dosing pump is switched on after 12 hours for approx. 6 s to relieve the pump hose.

11 Detailed Description of Functions

11.1 Control (pH, mV)

11.1.1 Proportional Range

The Proportional Range (p-range) is the range where the dosing rate is increased from 0 up to 100 % in proportion to the deviation between the setpoint (w) and the current measurement reading (x). Outside the proportional range (or "p" range), the dosage is always 100 %. The p-range is shown in % of the defined measurement range of the respective control variable.

$$\text{p-range [\%]} = \frac{x - w}{\text{measurement range}} \cdot 100$$

x Actual value
w Setpoint
Measurement range (pH: 10 pH / mV: 1000 mV)

11.1.2 Calculating the Dosing Rate

The Dosing Rate is generally calculated according to the following equation:

$$\text{Dos [\%]} = \frac{x - w}{\text{measurement range}} \cdot \frac{10000}{\text{p-range [\%]}}$$

Dos Dosing rate
x Actual value
w Setpoint
Measurement range (pH: 10 pH / mV: 1000 mV)

If Dos > 100 %, the value is limited to 100 %.

The on-time T_{Dos} for the dosing relay is derived from the calculated dosing rate and the programmed dosing period of the control module, as follows:

$$t_{Dos} = \frac{\text{Dos [\%]}}{100} \cdot T$$

Dos Dose
t_{Dos} Dosing time (calculated by the respective p-controller)
T Dosing period of manipulated variable output (configurable constant)

11.2 O_2 Automatic Dosing System

The quantity of BayroSoft to be dosed depends on the temperature of the pool water. The warmer the swimming pool water, the more BayroSoft must be added to ensure that the water will undergo the correct treatment.

Basically, the O_2 automatic dosing system has two different operating modes: automatic dosing with or without temperature compensation.

The operating mode is specified at the Customer Level by the setting "T-Comp. = inactive / low / high".

11.2.1 O_2 Automatic Dosing Without Temperature Compensation

In this operating mode, one or several dosing days can be programmed.

The exact programmed Dosing Amount is added on each of the specified dosing days.

11.2.2 O_2 Automatic Dosing with Temperature Compensation

In this operating mode, only one dosing day can be programmed. On that day, the main dosing takes place The dosing amount for the main dosing is temperature-compensated, i.e. the warmer the water, the more BayroSoft is added. In addition, up to 2 "top-up" dosings take place each week. These take place one or two thirds of a week after the main dose (after 56 and 112 hours). The Dose Amount for these top-ups is also temperature-dependent. If the temperature is below 24°C, no top-up dosings take place.

11.2.2.1 Main Dosing

The main dosing takes place on the programmed dosing day. The dosing amount $M_{main\ dose}$ is calculated from the programmed dosing amount M_0 and a temperature-dependent multiplication factor Fk(T):

$M_{main\ dose} = M_0 \bullet Fk(T)$

The multiplication factor Fk(T) depends on the average temperature of the previous week. The following graphic shows the correlation:

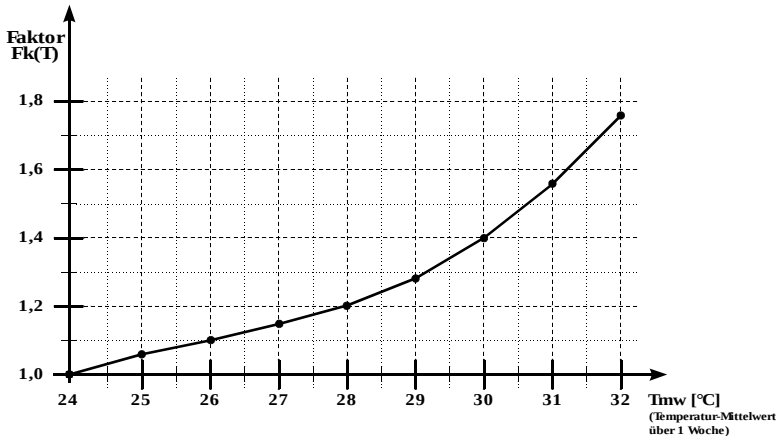


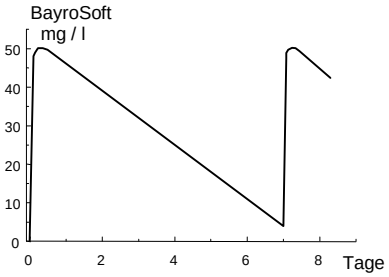
Figure 1 Factor Fk(T)

For temperatures below 24 °C, Fk(T) = 1, i.e. the programmed dosing amount is added.

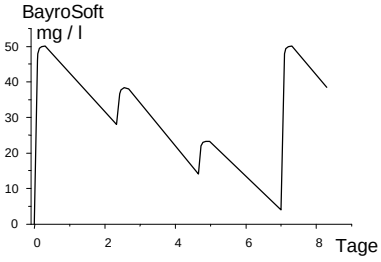
The dose amount is corrected to compensate for the increased attrition of the care product at higher temperatures.

11.2.2.2 Top-Up Dosings

In addition to the main dosing on the programmed dosing day, "top-up" dosings are given twice a week, depending on the temperature. These prevent any excessive reduction in the product content in the water between main dosings.



Automatic dosing at 24 °C (BayroSoft content over one week)



Automatic dosing at 28 °C (with two top-up doses)

The amounts used for the top-up dosings are calculated as follows:

1. The time between 2 main dosings (= 1 week) is split into 3 thirds. The top-up dosings are given after the 1st and 2nd third, i.e. 56 and 112 hours after the main dosing.

2. The average temperature "Tmd" is calculated for each third of the week.

3. The dosing amount for the top-up dosing $M_{top\text{-}up}$ is calculated from the programmed dosing amount M_0 and the factor $F_{top\text{-}up}$ according to the following equation:

$$M_{top\text{-}up} = M_0 \bullet F_{top\text{-}up}$$

The factor $F_{top\text{-}up}$ depends on the average temperature "Tmd" for the third of the week before the top-up dose. In addition, it depends on the "T-Comp." setting at the Customer Level = low / high (Config. O_2).

Depending on whether the care product is being consumed at a high or a normal rate, the top-up dose can be adapted by choosing the setting "high" or "low".

The following table shows the relationship used to calculate the $F_{top\text{-}up}$ factor.

	Average temperature for the previous third of the week Tmd [°C]				
	£ 24	**24-26**	**26-28**	**28-30**	**> 30**
T-Comp. = low	0	0.1	0.2	0.3	0.4
T-Comp. = high	0	0.2	0.4	0.6	0.8

At temperatures below 24°C, no top-up dosing takes place ($F_{top\text{-}up}$ = 0).

12 Electrical Connections

12.1 Connections on the Controller Housing

Figure: Controller housing from below from the right

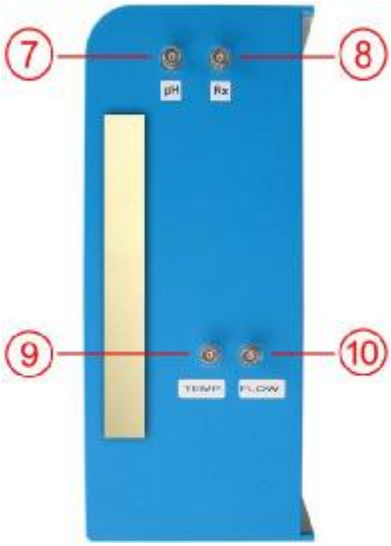


Figure: Controller housing

Controller housing - bottom	
1	Power plug, power supply (240V, 50Hz) for controller – continuous power supply
2	Power plug, power supply (240V, 50Hz) for dosing pump – connect via circulating pump (Circulation on => Power supply for dosing pumps present; Circulation off => Power supply for dosing pumps not present
3	Flockmatic connection (optional in all care variants)
4	Magnetic valve connection (only for Pool Relax Bromine)
5	Connection for level switch of pH suction lance
6	Connection for level switch of suction lance for ChloriLiquid/BayroSoft (for Pool Relax Bromine: BNC connector)
Controller housing - right side	
7	pH electrode connection
8	Redox electrode connection
9	Temperature sensor connection (Pool Relax O_2 only, otherwise BNC connector)
10	Flow switch connection

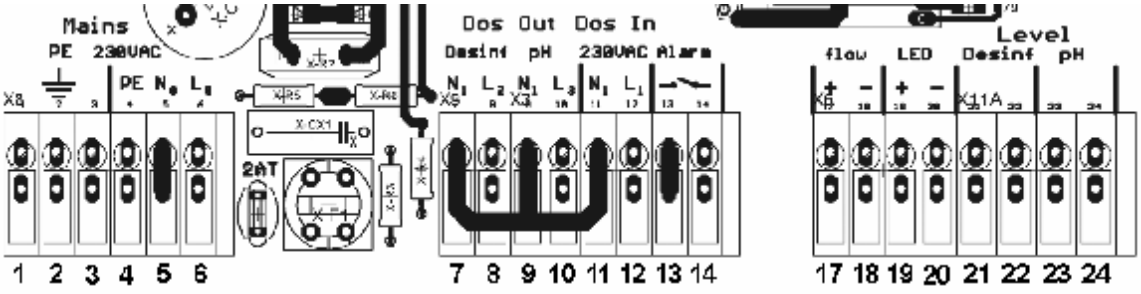
For safety reasons, Pool Relax features separate supply voltages for the pH and ChloriLiquid/BayroSoft dosing pumps as described above.

If the supply voltage for the dosing pumps is to be provided via a continuous power source and not via the circulation, the power plug of connection 2 can be connected to the same supply as the controller.

	ATTENTION: Connecting the power supply of the dosing pumps with a continuous power source bypasses an important safety feature. Use of the locking system via the circulation is strongly recommended.

12.2 Connections in the Controller Housing

The following figure shows the controller board with all connecting terminals.

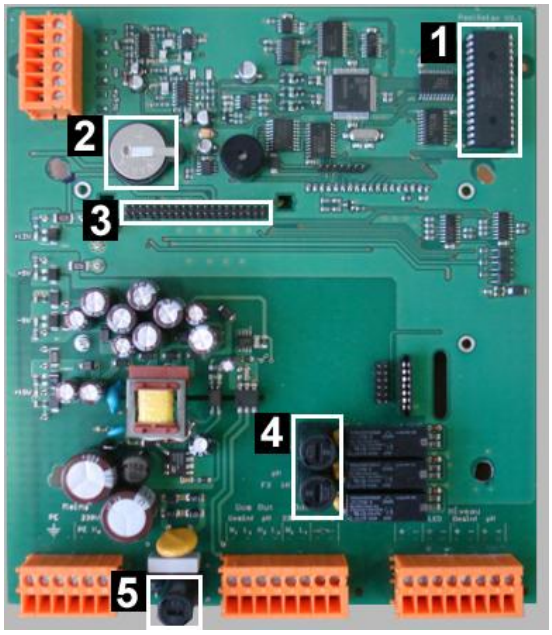


Group	Function	Individual connections	
1, 2, 3	PE (protective earth) for dosing pumps	1	PE
		2	PE
		3	PE
4, 5, 6	230VAC connection for power supply of Pool Relax. This input is independent of the supply of the dosing outputs (7/8 or 9/10).	4	PE
		5	N (device input)
		6	L (device input)
7, 8	Dosing output, disinfection	7	N (disinf. output)
		8	L (disinf. output)
9, 10	Dosing output pH- / pH-/+	9	N (pH output)
		10	L (pH output)
11, 12	Input for the power supply of the pH- / pH-/+ dosing outputs (7/8) (protected with 1A) and of the disinfection dosing output (9/10) (protected with 1A)	11	N (pH/disinf. input)
		12	L (pH/disinf. input)
13, 14	Alarm relay output (potential-free)	13	Alarm relay
		14	Alarm relay
15, 16	Temperature signal	15	+
		16	-
17, 18	Flow	17	Flow
		18	Flow
19, 20	LED	19	LED+
		20	LED-
21, 22	Disinfection level input	21	+
		22	-
23, 24	Level input pH	23	+
		24	-
25, 26	mV signal	25	+
		26	-
27, 28	pH signal	27	+
		28	-

13 Service

13.1 Controller Board

The following figure shows the relevant component positions on the controller board.



1 – EPROM
2 – Battery
3 – PoolConnect Slot
4 – Fuse / 2x 1A T (20 mm, slow)
5 – Fuse / 1x 2A T (20 mm, slow)

Figure Component positions on board

13.1.1 Exchange of EPROMs (Software Update)

The EPROM is the program memory and contains the controller's entire operating software. The EPROM is socket-mounted and is therefore easy to replace if a software update is required.

The position and orientation of the EPROM is shown in the picture.

13.1.2 Changing the Buffer Battery

The buffer battery (CR 2032) is retained in a special holder and is easy to replace. The plus pole on the battery faces upwards.

The position of the battery can be seen in the picture.

13.1.3 Changing the Fuse

Each of the 230 VAC supplies of the dosing outputs for pH and disinfection (mV or O_2) and the power supply of the controller is protected by a 1A T (20 mm, slow) fuse. The fuses are mounted in a special fuse holder and are easy to replace. The fuse holder is opened using a flat screwdriver.

The position of the fuse holders is shown in the picture.

13.1.4 PoolConnect Slot

A PoolConnect (Art. no. 173 600) module can be plugged into the marked slot. This module enables comprehensive communication of Pool Relax with a mobile phone. For more details, please refer to the device manual or the BAYROL homepage.

13.2 Calibration Examples

Close the taps on the measuring water extractor and measuring water return. Remove the respective electrode from the measurement chamber and clean it (rinse and dry with paper towel), ensuring that there are no air bubbles at the tip of the electrode. Immerse the electrode in the buffer solution.

Then proceed as follows:

13.2.1 1-Point Calibration pH

- Enter the Customer Level (use either 123 or 456).
- Move the cursor to *Config. pH* and press OK.
- Using the arrow keys, move to *1-point cal*. and press OK.
- Place the pH electrode in a buffer solution of pH 7.00
- Wait a few moments until a stable measurement is displayed.
- Move the cursor to *Cal. value* and press OK.
- Set pH 7.00 and press OK.
- Move the cursor to line *1-point cal. OK* and press OK.
- The value is now accepted and the electrode is calibrated.
- Screw the electrode back into the measurement chamber.

13.2.2 2-Point Calibration pH

- Enter the Customer Level (456, only available in Service Mode).
- Move the cursor to *Config. pH* and press OK.
- Using the arrow keys, move to *2-point cal*. and press OK.
- Place the pH electrode in a buffer solution of pH 9.00
- Wait a few moments until a stable measurement is displayed.
- Move the cursor to *U-cal. value* (upper calibration value) and press OK.
- Set pH 9.00 and press OK.
- Move the cursor to line *2-point cal. pH-U OK* and press OK.
- Rinse the electrode and place it in a buffer solution of pH 7.00.
- Wait a few moments until a stable measurement is displayed and then move the cursor to *L-cal value*.
- Enter pH value 7.00 and press OK.
- Move the cursor to *2-point cal. pH-L OK* and press OK.
- Now the calculated electrode slope and offset are displayed.
- Press OK.
- The calculated values are now accepted.
- Screw the electrode back into the measurement chamber.

13.2.3 1-Point Calibration Redox

- Enter the Customer Level (use either 123 or 456).
- Move the cursor to *Config. mV* and press OK.
- Using the arrow keys, move to *1-point cal*. and press OK.
- Place the redox electrode in a buffer solution of 465 mV.
- Wait a few moments until a stable measurement is displayed.
- Move the cursor to *Cal. value* and press OK.
- Set 465 mV and press OK.
- Move the cursor to line *1-point cal. OK* and press OK.
- The value is now accepted and the electrode is calibrated.
- Screw the electrode back into the measurement chamber.